

Prevention of Significant Air Quality Deterioration Review

Preliminary Determination

January 15, 2020

Facility Name: Varn Wood Products, LLC

City: Hoboken

County: Brantley

AIRS Number: 04-13-025-00001

Application Number: 509812

Date Application Received: October 6, 2020

Review Conducted by:

State of Georgia - Department of Natural Resources

Environmental Protection Division - Air Protection Branch

Stationary Source Permitting Program

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SUMMARY	i
1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA	1
2.0 PROCESS DESCRIPTION	3
3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS	4
State Rules	4
Federal Rule - PSD	5
New Source Performance Standards	6
National Emissions Standards For Hazardous Air Pollutants	6
4.0 CONTROL TECHNOLOGY REVIEW.....	7
5.0 TESTING AND MONITORING REQUIREMENTS.....	13
6.0 AMBIENT AIR QUALITY REVIEW.....	14
Modeling Requirements	14
7.0 ADDITIONAL IMPACT ANALYSES	16
8.0 GEORGIA TOXIC AIR POLLUTANT MODELING ANALYSIS	17
8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS.....	19

SUMMARY

The Environmental Protection Division (EPD) has reviewed the application submitted by Varn Wood Products, LLC (hereinafter “facility”) for a permit to convert existing direct fired wood drying kiln K02 from a batch to a continuous kiln. The proposed project will convert the existing batch lumber drying kiln K02 to a continuous lumber drying kiln. The kiln will remain direct-fired, and the dry shavings combustion unit that currently provides heated air to the kiln will not be modified. Lumber throughput will increase from a baseline actual throughput of 39.1 MMbf/yr. to a maximum potential of 85 MMbf/yr.

The proposed project will result in an increase in emissions from the facility. The sources of these increases in emissions include wood drying kiln K02.

The modification of the Varn Wood Products, LLC facility due to this project will result in an emission increase in particulate matter (PM/PM₁₀/PM_{2.5}), volatile organic compounds (VOC) nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), lead, single and combined hazardous air pollutants (HAP), and total greenhouse gases (Total GHG). A Prevention of Significant Deterioration (PSD) analysis was performed for the facility for all pollutants to determine if any increase was above the “significance” level. The VOC emissions increase was above the PSD significant level threshold.

The Varn Wood Products, LLC facility is located in Brantley County, which is classified as “attainment” or “unclassifiable” for SO₂, PM_{2.5} and PM₁₀, NO_x, CO, and ozone (VOC).

The EPD review of the data submitted by Varn Wood Products, LLC related to the proposed modifications indicates that the project will be in compliance with all applicable state and federal air quality regulations.

It is the preliminary determination of the EPD that the proposal provides for the application of Best Available Control Technology (BACT) for the control of VOC, as required by federal PSD regulation 40 CFR 52.21(j).

It has been determined through approved modeling techniques that the estimated emissions will not cause or contribute to a violation of any ambient air standard or allowable PSD increment in the area surrounding the facility or in Class I areas located within 200 km of the facility. It has further been determined that the proposal will not cause impairment of visibility or detrimental effects on soils or vegetation. Any air quality impacts produced by project-related growth should be inconsequential.

This Preliminary Determination concludes that an Air Quality Permit should be issued to Varn Wood Products, LLC for the modifications necessary to convert existing direct fired wood drying kiln K02 from a batch to a continuous kiln. Various conditions have been incorporated into the current Title V operating permit to ensure and confirm compliance with all applicable air quality regulations. A copy of the draft permit amendment is included in Appendix A. This Preliminary Determination also acts as a narrative for the Title V Permit.

1.0 INTRODUCTION – FACILITY INFORMATION AND EMISSIONS DATA

On October 5, 2020, Varn Wood Products, LLC (hereafter Varn) submitted an application for an air quality permit to convert existing direct fired wood drying kiln K02 from a batch to a continuous kiln. The facility is located at 107 N. Brantley St. in Hoboken, Brantley County.

Table 1-1: Title V Major Source Status

Pollutant	Is the Pollutant Emitted?	If emitted, what is the facility's Title V status for the Pollutant?		
		Major Source Status	Major Source Requesting SM Status	Non-Major Source Status
PM	✓	✓		
PM ₁₀	✓	✓		
PM _{2.5}	✓			✓
SO ₂	✓	✓		
VOC	✓	✓		
NO _x	✓	✓		
CO	✓	✓		
TRS	n/a			
H ₂ S	n/a			
Individual HAP	✓	✓		
Total HAPs	✓	✓		
Total GHGs	✓			✓

Table 1-2 below lists all current Title V permits, all amendments, 502(b)(10) changes, and off-permit changes, issued to the facility, based on a review of the "Permit" file(s) on the facility found in the Air Branch office.

Table 1-2: List of Current Permits, Amendments, and Off-Permit Changes

Permit Number and/or Off-Permit Change	Date of Issuance/ Effectiveness	Purpose of Issuance
2421-025-0001-V-04-0	August 2, 2018	Title V Renewal
2421-025-0001-V-04-1	November 27, 2019	VOC Emission Factor Update

Based on the proposed project description and data provided in the permit application, the estimated incremental increases of regulated pollutants from the facility are listed in Table 1-3 below:

Table 1-3: Emissions Increases from the Project

Pollutant	Baseline Years	Past Actual	Future Actual	Total Increase (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
PM	2018 – 2019	4.96	10.8	5.84	25	No
PM ₁₀	2018 – 2019	2.37	5.16	2.79	15	No
PM _{2.5}	2018 – 2019	2.07	4.49	2.42	10	No
VOC	2018 – 2019	78.2	170	91.8	40	Yes
NO _x	2018 – 2019	5.48	11.9	6.42	40	No

Pollutant	Baseline Years	Past Actual	Future Actual	Total Increase (tpy)	PSD Significant Emission Rate (tpy)	Subject to PSD Review
CO	2018 – 2019	14.3	31.0	16.7	100	No
SO ₂	2018 – 2019	1.41	3.07	1.66	40	No
TRS	N/A	N/A	N/A	N/A	10	No
Pb	2018 – 2019	0.00271	0.00589	0.00318	0.6	No
Fluorides	N/A	N/A	N/A	N/A	3	No
H ₂ S	N/A	N/A	N/A	N/A	10	No
SAM	N/A	N/A	N/A	N/A	7	No
Total GHG	ND	ND	ND	ND	75,000	No

The definition of baseline actual emissions is the average emission rate, in tons per year, at which the emission unit actually emitted the pollutant during any consecutive 24-month period selected by the facility within the 10-year period immediately preceding the date a complete permit application was received by EPD. The net increases were calculated by subtracting the past actual emissions (based upon the annual average emissions from 2018 and 2019) from the future projected actual emissions of the wood drying kiln K02 and associated emission increases from non-modified equipment. Table 1-3 details this emissions summary. The emissions calculations for Table 1-3 can be found in detail in the facility's PSD application (see Table 1.1 and Appendix B of Application No. 509812). Note that the application did not document any emission changes for Total GHG because the proposed modification does not modify any existing fuel burning sources or add any fuel burning sources. These calculations have been reviewed and approved by the Division.

Based on the information presented in Table 1-3 above, Varn's proposed modification, as specified per Georgia Air Quality Application No. 509812, is classified as a major modification under PSD because the potential emissions of VOC (91.8 tpy) exceed the corresponding PSD Significant Emission Rate (40 tpy).

Through its new source review procedure, EPD has evaluated Varn's proposal for compliance with State and Federal requirements. The findings of EPD have been assembled in this Preliminary Determination.

2.0 PROCESS DESCRIPTION

According to Application No. 509812, Varn has proposed to convert the existing batch lumber drying kiln K02 to a continuous lumber drying kiln. The kiln will remain direct-fired, and the dry shavings combustion unit that currently provides heated air to the kiln will not be modified. Lumber throughput will increase from a baseline actual throughput of 39.1 MMbf/yr. to a maximum potential of 85 MMbf/yr. The burner capacity of 28 MMBtu/hr. will not change. Emission increases for the project subjects the facility to PSD review for VOC.

The Varn permit application and supporting documentation can be found online at www.georgiaair.org/airpermit.

3.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

State Rules

Georgia Rule for Air Quality Control (Georgia Rule) 391-3-1-.03(1) requires that any person prior to beginning the construction or modification of any facility which may result in an increase in air pollution shall obtain a permit for the construction or modification of such facility from the Director upon a determination by the Director that the facility can reasonably be expected to comply with all the provisions of the Act and the rules and regulations promulgated thereunder. Georgia Rule 391-3-1-.03(8)(b) continues that no permit to construct a new stationary source or modify an existing stationary source shall be issued unless such proposed source meets all the requirements for review and for obtaining a permit prescribed in Title I, Part C of the Federal Act [i.e., Prevention of Significant Deterioration of Air Quality (PSD)], and Section 391-3-1-.02(7) of the Georgia Rules (i.e., PSD).

The proposed continuous drying kiln (ID No. K02) will be subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(b), "Visible Emissions." Georgia Rule (b) limits the opacity of the emissions from the continuous drying kiln (ID No. K02) to forty (40) percent. With the operating nature of the direct wood-fired kiln, compliance with the Rule (b) visible emission limit is expected.

The proposed continuous drying kiln (ID No. K02) will also be subject to Georgia Rules for Air Quality Control 391-3-1-.02(2)(e), "Particulate Emission from Manufacturing Processes." Since the kiln is installed after July 2, 1968, the allowable PM emission rate from the proposed continuous drying kiln (ID No. K02) is specified by Georgia Rule 391-3-1-.02(2)(e)1.(i), which is stated as follows:

$$E = 4.1 * P^{0.67} \quad \text{for process input weight rate up to and including 30 tons per hour.}$$

$$E = 55 * P^{0.11} - 40 \quad \text{for process input weight rate above 30 tons per hour.}$$

Where E equals the allowable PM emission rate in pounds per hour and P equals the process input weight rate in tons per hour.

Compliance with the GA Rule (e) PM emission standards are expected as follows.

Name/ID No.	Process Input Weight Rate (P) (bf/hr.)	Process Input Weight Rate (P) (tons/hr.)	Allowable Emission Rate (E) (lbs. PM / hr.)
Continuous Drying Kiln K02	9,700	19.4	$P = 4.1 * 19.4^{0.67} = 29.9$

$$1 \text{ ft}^3 = 12 \text{ bf}$$

$$\text{Assumed Wood Density} = 48 \text{ lbs./ft}^3$$

$$85,000,000 \text{ bf/yr.}$$

$$= 9,700 \text{ bf/hr.}$$

$$= (9,700 \text{ bf/hr.}) * (1 \text{ ft}^3/12\text{bf}) * (48 \text{ lbs./ft}^3) * (1 \text{ ton}/2,000 \text{ lbs.})$$

$$= 19.4 \text{ tph}$$

PM Emission Rate of the proposed continuous drying kiln (ID No. K02)
= (0.14 lb. PM/1000bf)*(9,700 bf/hr.)
= 1.36 lbs. PM/hr. < 29.9 lbs. PM/hr.

Since the proposed continuous drying kiln (ID No. K02) is a direct fired unit, it is subject to the fuel sulfur requirement ($\leq 2.5\%$ sulfur) specified in Georgia Rules for Air Quality Control 391-3-1-.02(2)(g), "Sulfur Dioxide." Compliance with Georgia Rule (g) for the proposed continuous drying kiln (ID No. K02) is always expected because the kiln only fires wood, and wood contains negligible sulfur content.

Federal Rule - PSD

The regulations for PSD in 40 CFR 52.21 require that any new major source or modification of an existing major source be reviewed to determine the potential emissions of all pollutants subject to regulations under the Clean Air Act. The PSD review requirements apply to any new or modified source which belongs to one of 28 specific source categories having potential emissions of 100 tons per year or more of any regulated pollutant, or to all other sources having potential emissions of 250 tons per year or more of any regulated pollutant. They also apply to any modification of a major stationary source which results in a significant net emission increase of any regulated pollutant.

Georgia has adopted a regulatory program for PSD permits, which the United States Environmental Protection Agency (EPA) has approved as part of Georgia's State Implementation Plan (SIP). This regulatory program is located in the Georgia Rules at 391-3-1-.02(7). This means that Georgia EPD issues PSD permits for new major sources pursuant to the requirements of Georgia's regulations. It also means that Georgia EPD considers, but is not legally bound to accept, EPA comments or guidance. A commonly used source of EPA guidance on PSD permitting is EPA's Draft October 1990 New Source Review Workshop Manual for Prevention of Significant Deterioration and Nonattainment Area Permitting (NSR Workshop Manual). The NSR Workshop Manual is a comprehensive guidance document on the entire PSD permitting process.

The PSD regulations require that any major stationary source or major modification subject to the regulations meet the following requirements:

- Application of BACT for each regulated pollutant that would be emitted in significant amounts;
- Analysis of the ambient air impact;
- Analysis of the impact on soils, vegetation, and visibility;
- Analysis of the impact on Class I areas; and
- Public notification of the proposed plant in a newspaper of general circulation

The following is a discussion of the applicable federal rules and regulations pertaining to the equipment that is the subject of this preliminary determination, which is then followed by the top down BACT analysis.

New Source Performance Standards

The proposed continuous drying kiln (ID No. K02) is not subject to any NSPS.

National Emissions Standards For Hazardous Air Pollutants

Per 40 CFR 63.2231, the facility is subject to 40 CFR 63 Subpart DDDD, “National Emission Standards for Hazardous Air Pollutants: Plywood and Composite Wood Products,” (a.k.a. PCWP MACT) because it is major for single and combined HAP emissions and is a plywood and composite wood products manufacturing facility that manufactures kiln-dried lumber. Please note that the kilns are not subject to any compliance options specified in Tables 1A and 1B to Subpart DDDD, any operating requirements specified in Table 2 to Subpart DDDD, or any work practice requirements specified in Table 3 to Subpart DDDD. According to 40 CFR 63.2252, the facility is only subject to the initial notification requirements specified in 40 CFR 63.9(b). By submitting Application No. TV-509812, the Division has determined that the facility has met the initial notification requirements. Therefore, the proposed continuous drying kiln (ID No. K02) is subject to this rule but is not subject to any requirements.

State and Federal – Startup and Shutdown and Excess Emissions

Excess emission provisions for startup, shutdown, and malfunction are provided in Georgia Rule 391-3-1-.02(2)(a)7. Excess emissions from the proposed continuous drying kiln (ID No. K02) associated with the proposed project would most likely result from a malfunction of the associated control equipment. The facility cannot anticipate or predict malfunctions. However, the facility is required to minimize emissions during periods of startup, shutdown, and malfunction.

Federal Rule – 40 CFR 64 – Compliance Assurance Monitoring

Under 40 CFR 64, the *Compliance Assurance Monitoring* Regulations (CAM), facilities are required to prepare and submit monitoring plans for certain emission units with the Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation applies to units that use a control device to achieve compliance with an emission limit and whose pre-controlled emissions levels exceed the major source thresholds under the Title V permitting program. Although other units may potentially be subject to CAM upon renewal of the Title V operating permit, such units are not being modified under the proposed project and need not be considered for CAM applicability at this time.

This applicability evaluation only addresses the proposed continuous drying kiln (ID No. K02), which does not employ any air pollution control devices; therefore, the CAM requirements are not triggered by the proposed modification.

4.0 CONTROL TECHNOLOGY REVIEW

The proposed project will result in emissions that are significant enough to trigger PSD review for the following pollutants: VOC.

Definition of BACT

The PSD regulation requires that BACT be applied to all regulated air pollutants emitted in significant amounts. Section 169 of the Clean Air Act defines BACT as an emission limitation reflecting the maximum degree of reduction that the permitting authority (in this case, EPD), on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a facility through application of production processes and available methods, systems, and techniques. In all cases BACT must establish emission limitations or specific design characteristics at least as stringent as applicable New Source Performance Standards (NSPS). In addition, if EPD determines that there is no economically reasonable or technologically feasible way to measure the emissions, and hence to impose and enforceable emissions standard, it may require the source to use a design, equipment, work practice or operations standard or combination thereof, to reduce emissions of the pollutant to the maximum extent practicable.

EPA's NSR Workshop Manual includes guidance on the 5-step top-down process for determining BACT. In general, Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPA reviews. The five steps of a top-down BACT review procedure identified by EPA per BACT guidelines are listed below:

- Step 1: Identification of all control technologies;
- Step 2: Elimination of technically infeasible options;
- Step 3: Ranking of remaining control technologies by control effectiveness;
- Step 4: Evaluation of the most effective controls and documentation of results; and
- Step 5: Selection of BACT.

Continuous Drying Kiln K02- Background

The proposed continuous drying kiln (Source Code K02) is a direct-fired batch kiln that fires exclusively wood. The proposed kiln will have a design throughput capacity of 85 MMbf/yr., and has a burner capacity of 28 MMBtu/hr. The primary purpose of the continuous drying kiln (ID No. K02) is to lower the moisture content in the lumber to a desired level before sending the lumber to the planer mill and other downstream processes.

Continuous Drying Kiln K02 – VOC Emissions

Applicant's Proposal

Both combustion of wood in the kiln burner and continuous drying of the southern pine lumber would generate VOC emissions. Note that the National Council for Air and Stream Improvement (NCASI) VOC emission factor would include both VOC emissions from wood combustion and lumber drying. The facility proposed the following BACT analysis for VOC emissions from the new kiln.

Step 1: Identify all control technologies

The facility considered VOC emissions control techniques/technologies as noted below.

Option 1: Thermal Oxidizers
Option 2: Adsorption
Option 3: Condensers
Option 4: Biofilters
Option 5: Wet Scrubbers
Option 6: Proper Kiln Design and Operation

Option 1: Thermal Oxidizers

In a regenerative thermal oxidizer (RTO), the VOC compounds in the exhaust gas enter the combustion chamber where it is oxidized into carbon dioxide and water vapor. Typical combustion chamber temperature is maintained around 1,400°F to 1,500°F. A regenerative thermal oxidizer uses a high-density packed heat transfer media, typically ceramic random saddle packing or honeycomb monolith structures, to preheat the incoming gas stream and to achieve 85 to 95% heat recovery.

Option 2: Adsorption

Adsorption systems use an adsorbent bed to trap VOC. As the exhaust gas stream passes through the adsorbent bed, VOC molecules are attracted to the surface of the adsorbent. The clean exhaust gas is then discharged to the atmosphere. When the adsorbent is spent and can no longer effectively adsorb VOC, the adsorbent can be reactivated either by heating with steam or by vacuuming to remove VOC from the surface. Reactivation can occur on-site, or the spent adsorbent may be returned to the supplier for reactivation.

Option 3: Condensers

Condensers operate by cooling the gas stream below the vaporization point for VOC; thus, converting VOC in the exhaust gas from the vapor phase to the liquid phase. The phase change is usually accomplished by decreasing the temperature of the gas stream, but it can also be accomplished by increasing the pressure of the gas stream enough to cause the vapor to liquefy. The condensate can either be disposed through a wastewater treatment system or can be recycled by distillation.

Option 4: Biofilters

Biofilters involve the use of microbes which remove organics from the exhaust gas stream by feeding on the organic material. The exhaust gas stream from the exhaust is directed through the bed media in which the microbes live. Organics are adsorbed by moisture in the bed media and come into contact with the microbes. The microbes reduce the concentration of organics by consuming the organic material. The cleaned air is then discharged to the atmosphere.

Option 5: Wet Scrubbers

The wet scrubbing control technology consists of a transfer of VOC compounds in the gas stream by passing the stream through a countercurrent flow of a scrubbing liquid. Pollutants are impacted by the liquid droplets and dissolve in the liquid. This technology is used in many control applications.

Option 6: Proper Kiln Design and Operation

Process control or optimization uses proper lumber kiln operation techniques which include the necessary process monitoring instruments, process control equipment, schedule equipment inspection and maintenance in accordance with manufacturer's recommendations. Process controls are used to maintain proper moisture and temperature settings to optimize the kiln drying operation. Proper kiln temperature and humidity settings can minimize VOC emitted from the kilns.

Step 2: Eliminate technically infeasible options

Option 1: Thermal Oxidizers

The exhaust gas stream from this kiln has a temperature of around 130°F and also has a high moisture content. The high moisture content and relatively low exit temperature of the exhaust gas makes an RTO unsuitable. Particulates present in the exhaust gas could also cause fouling of the ceramic material. The fouled ceramic would not provide the necessary preheating needed for the RTO to be effective. For these reasons, thermal oxidation by an RTO is deemed to be technically infeasible.

Option 2: Adsorption

The gas stream from the lumber kiln is very high in moisture content. That moisture preferentially condenses onto the adsorbent surface leaving less area available for the VOC molecules thus reducing control efficiency. The control equipment sizing is also complicated by the variable flow rates. Most adsorption units are not recommended for the higher operating temperatures encountered with lumber kilns.

Option 3: Condensers

Condensers are mostly effective for applications where there is high VOC concentration in the gas stream, of around 5,000 ppmvd. In the typical lumber kiln exhaust, the concentration is highly variable and usually below 1,000 ppm. The VOC emissions from a lumber kiln consist mostly of terpenes, which would require the temperature of the exhaust stream to be lowered to well below 0 °F in order to have a low enough vapor pressure to use condensation. Further, the viscous condensate from the condenser would result in frequent equipment plugging and related maintenance challenges.

Option 4: Biofilters

The microorganism used in biofiltration cannot survive at temperatures exceeding 105 °F; however, the temperature of the exhaust stream from the kiln will be approximately 130 °F. Furthermore, the primary constituents of the VOC in the exhaust stream are terpenes, which are highly viscous and would cause the biofilter to easily foul.

Option 5: Wet Scrubbers

Wet scrubbers are used in many control applications but are not well suited for VOC controls for a lumber kiln. The VOC emissions from a lumber kiln consist mostly of terpenes, which have low water solubility. Further, the viscous condensate would result in frequent plugging of the equipment. Therefore, wet scrubbers are not considered technically feasible for controlling VOC emissions from a lumber kiln.

Step 3: Ranking the Remaining Control Technologies by Control Effectiveness

In this step of the top down BACT analysis, the remaining technically feasible options are ranked in order of their control efficiencies. There is only one technically feasible option which is shown below.

Table 4-1: Ranking of VOC Control Technology for the continuous drying kiln K02

Control Technology Ranking	Control Technology	Control Efficiency
Option 6	Proper Kiln Design and Operation	Variable due to design

Step 4: Evaluating the Most Effective Controls and Documentation

Since the only technically feasible BACT option is Proper Kiln Design and Operation, further evaluation of controls is not necessary.

Step 5: Selection of BACT

The applicant has identified BACT as Proper Kiln Design and Operation.

BACT is generally an emission limit. However, in the case of continuous kilns which are an emerging technology, enough test data does not exist to impose a limit on the facility. Therefore, BACT in this case is not a numerical value but proper maintenance and work practices. The facility is required to develop and implement an operating and maintenance plan within 180 days of start-up of the continuous kilns.

EPD Review – VOC Control

The Division agrees with the facility that wet scrubbing is technically infeasible because of low solubility of terpenes. The Division also agrees that thermal oxidizers are technically infeasible because of high moisture content and relatively low temperature of the exhaust stream and VOC concentration variation. Adsorption and biofilters are also technically infeasible because of the high moisture content of the exhaust gas stream and the exhaust temperature. Condensers are also technically infeasible because of the relatively low and varying VOC concentration in the exhaust. Also, plugging of equipment due to the viscous condensate would pose a challenge to wet scrubbing, adsorption/biofilters, and condensers.

The Division reviewed all of the RBLC entries for VOC from continuous lumber drying kilns since 2002. This review showed that none of the entries required an add-on control device for VOC and that BACT is Proper Maintenance and Operating Practices.

The review of RBLC shows BACT limit of 3.8 lbs./MMbf for kilns located in South Carolina and Arkansas. However, during correspondence with those agencies it was confirmed that those limits are put in place for the purpose of calculating VOC emissions for future permitting & emissions inventory purposes. The kilns were never tested and are not required to be tested due to the inherent challenges involved in testing these kilns and variations in wood.

GA EPD uses a VOC emission factor of 4.0 lbs./MMbf in kiln applications which is a more conservative factor than the 3.8 lbs./MMbf found in the BACT LAER clearinghouse. NCASI updated its recommended emission factors in 2007. Below are the current emission factors for a steam-heated southern yellow pine drying kiln.

VOC Emission Factor = 3.2 lbs. VOC as carbon/1,000 bf (lbs. VOC as carbon/Mbf)

Formaldehyde Emission Factor = 0.0149 lb. formaldehyde/MMbf

Methanol Emission Factor = 0.236 lb. methanol/MMbf

In Interim VOC Measurement Protocol for the Wood Products Industry – July 2007, U.S. EPA established calculation procedures and emission measurement methods to approximate VOC emissions for determining applicability with federal programs (particularly for NSR and Title V) and to establish consistency across state programs for the forest products industry. In general, VOC is to be calculated as Total Hydrocarbons (THC) expressed as propane plus methanol formaldehyde and acetaldehyde expressed as compounds, minus adjustments (The flame ionization analyzer (FIA) used to measure THC partially measures methanol, resulting in partial “double counting” since methanol is also measured individually according to WPP1. To avoid double-counting, a percentage of the methanol measured is subtracted from the THC measurement some methanol may be picked up by Method 25A). Although the majority of VOC from drying southern yellow pine are terpenes, when testing VOC emissions using EPA Reference Method 25A, propane is used to calibrate the instrument so VOC emissions as carbon should be converted to VOC emissions as propane; VOC as measured and calculated by this protocol is referred to as “WPP1 VOC” (Wood Products Protocol 1 VOC).

Molecular Weight of Propane (C₃H₈) / Molecular Weight of Carbon in Propane

= (12 * 3 + 1 * 8) / (12 * 3)

= 1.22

Total VOC Emission Factor

$$\begin{aligned}
 &= (\text{VOC as carbon} * 1.22) + \text{weight of methanol} + \text{weight of formaldehyde} - \text{Adjustment} \\
 &= 3.2 * 1.22 + 0.236 + 0.0149 - (0.65 * 0.236) \\
 &= 4.00 \text{ lbs. WPP1 VOC / MMbf}
 \end{aligned}$$

The Division agrees that the only technically feasible option is Proper Kiln Design and Operation. The Division will require that facility demonstrates proper kiln operation and maintenance practices; therefore, the BACT determination requires that the facility develop and implement a Work Practice and Preventive Maintenance Program for the continuous drying kiln (ID No. K02). These items are included in Condition 3.2.9 of the proposed Title V permit amendment.

VOC does not have any National Ambient Air Quality Standards (NAAQS). VOC is a precursor of Ozone which has an 8-hr NAAQS. Georgia is located in a NO_x limited area. The increase in VOC emissions from this proposed project is not expected to significantly affect ozone concentrations in the vicinity of this mill. Because of this and that the determined VOC BACT does not involve any add-on control, the Division has determined that the proposed permit need not include a short-term VOC BACT limit for the continuous drying kiln (ID No. K02). In addition, periodic performance testing for demonstrating compliance with a short-term VOC emission limit would be cost prohibitive.

The facility also proposes to use the design throughput rate, 85 MMbf/yr. for the continuous drying kiln (ID No. K02) as the long term BACT limit. This is included in Condition 3.2.8 of the proposed Title V permit amendment.

Conclusion – VOC Control

The BACT selection for the continuous drying kiln (ID No. K02) is summarized below in Table 4-1:

Table 4-1: BACT Summary for the continuous drying kiln (ID No. K02)

Pollutant	Control Technology	Proposed BACT Limit	Compliance Determination Method
VOC	Proper Kiln Design and Operation	Work Practice and Preventative Maintenance Program	Recordkeeping of Maintenance Practices

5.0 TESTING AND MONITORING REQUIREMENTS

Testing Requirements:

There are no applicable testing requirements being imposed due to the results of the BACT analysis.

Monitoring Requirements:

There are no applicable monitor requirements being imposed due to the results of the BACT analysis.

CAM Applicability:

Because there is no control device for the continuous drying kiln (ID No. K02), CAM is not applicable and is not being triggered by the proposed modification. Therefore, no CAM provisions are being incorporated into the facility's permit.

6.0 AMBIENT AIR QUALITY REVIEW

An air quality analysis is required to determine the ambient impacts associated with the construction and operation of the proposed modifications. The main purpose of the air quality analysis is to demonstrate that emissions emitted from the proposed modifications, in conjunction with other applicable emissions from existing sources (including secondary emissions from growth associated with the new project), will not cause or contribute to a violation of any applicable National Ambient Air Quality Standard (NAAQS) or PSD increment in a Class I or Class II area. NAAQS exist for NO₂, CO, PM_{2.5}, PM₁₀, SO₂, Ozone (O₃), and lead. PSD increments exist for SO₂, NO₂, and PM₁₀.

The proposed project at the Varn facility triggers PSD review for VOC. VOC does not have established PSD modeling significance levels (MSL) (an ambient concentration expressed in either µg/m³ or ppm). Therefore, modeling is not required for VOC emissions. Since neither of VOC emission increases and NO_x emission increases due to this modification exceed 100 tpy, no pre-construction monitoring is required.

An additional analysis was conducted to demonstrate compliance with the Georgia air toxics program. This section of the application discusses the air quality analysis requirements, methodologies, and results. Supporting documentation may be found in the Air Quality Dispersion Report of the application and in the additional information packages.

Modeling Requirements

Class I Area Analysis

Federal Class I areas are regions of special national or regional value from a natural, scenic, recreational, or historic perspective. Class I areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations. U.S. EPA has established policies and procedures that generally restrict consideration of impacts of a PSD source on Class I Increments to facilities that are located near a federal Class I area. Historically, a distance of 100 km has been used to define “near”, but more recently, a distance of 300 kilometers has been used for all facilities that do not combust coal.

The four Class I areas within approximately 300 kilometers of Varn Wood Products, LLC (approximate distance) are:

- Okefenokee National Wildlife Refuge (NWR) – 18 kilometers
- Wolf Island NWR – 79 kilometers
- St. Marks NWR – 211 kilometers
- Chassahowitzka Wilderness – 277 kilometers

The proposed project would cause a significant net emissions increase of VOC only, which is not a visibility or deposition-affecting pollutant and for which there are no Class I PSD increment. For this reason and because the project would not cause significant increases of NO_x, SO₂, or PM that may affect visibility or deposition and for which PSD Class I Increments have been established, Class I area impact analysis is not required.

The applicant submitted their AQRV impact analysis to the applicable Federal Land Manager (FLM). As of January 13, the FLM did not submit any comments.

Class II Area Analysis

VOC is the only criteria pollutant with emissions greater than the SER (40 tpy), therefore neither Class II area significant impact analysis, nor monitoring *De Minimis* concentration analysis is required.

7.0 ADDITIONAL IMPACT ANALYSES

PSD requires an analysis of impairment to visibility, soils, and vegetation that will occur as a result of a modification to the facility and an analysis of the air quality impact projected for the area as a result of the general commercial, residential, and other growth associated with the proposed project.

Soils and Vegetation

This analysis is required only for those pollutants for which PSD review is triggered. According to *A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals*, the relevant pollutants for soils and vegetation are NO₂, SO₂ and CO. The project triggers PSD review for VOC only and does not have a significant net emission increase of NO₂, SO₂ or CO. Therefore, a soils and vegetation analysis is not required because no significant impacts are expected.

Growth

The purpose of a growth analysis is to predict how much new growth is likely to occur as a result of the project and the resulting air quality impacts from this growth. The growth analysis evaluates the impact associated with the project on the general commercial, residential, and industrial growth within the project vicinity.

PSD requires an assessment of the secondary impacts from applicable projects. Negligible growth during construction is expected and minimal long-term growth (i.e., general commercial, residential, industrial or other secondary growth in the area) is expected following the completion of the project because no additional employees will be required to operate the modified mill. Therefore, no analysis of secondary impacts from associated growth is warranted for this project.

Visibility

VOC emissions do not impact visibility. Therefore, the project will not impact Class I and Class II visibility for purposes of PSD review of the project.

PSD regulations require an evaluation of the impact of project emissions on visibility in Class II areas. The analysis is required only for those pollutants for which PSD review is triggered. The relevant pollutants for visibility are PM, NO_x and SO₂. The project triggers PSD review for VOC only and does not have a significant net emissions increase of PM, NO_x and SO₂. Therefore, a visibility analysis is not necessary because no significant impacts are expected.

Conclusion

The project's air quality analysis reviewed and described in all sections above show conformance with the Class I and Class II PSD NAAQS. The potential soil and vegetation impacts and the Class II visibility analysis are not required. The proposed project will not cause or contribute to an exceedance of any NAAQS.

8.0 GEORGIA TOXIC AIR POLLUTANT MODELING ANALYSIS

Georgia EPD regulates the emissions of toxic air pollutant (TAP) emissions through a program covered by the provisions of *Georgia Rules for Air Quality Control*, 391-3-1-.02(2)(a)3.(ii). A TAP is defined as any substance that may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard. Procedures governing the Georgia EPD's review of TAP emissions as part of air permit reviews are contained in the agency's "*Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (Revised)*."

Selection of Toxic Air Pollutants for Modeling

For projects with quantifiable increases in TAP emissions, an air dispersion modeling analysis is generally performed to demonstrate that off-property impacts are less than the established Acceptable Ambient Concentration (AAC) values. The TAP evaluated are restricted to those that may increase due to the proposed project. Thus, the TAP analysis would generally be an assessment of off-property impacts due to facility-wide emissions of any TAP emitted by a facility. To conduct a facility-wide TAP impact evaluation for any pollutant that could conceivably be emitted by the facility is impractical. A literature review would suggest that at least one molecule of hundreds of organic and inorganic chemical compounds could be emitted from the various combustion units. This is understandable given the nature of the wood chips fed to the combustion sources, and the fact that there are complex chemical reactions and combustion of fuel taking place in some. The vast majority of compounds potentially emitted however are emitted in only trace amounts that are not reasonably quantifiable.

Per Section 8.0 and Appendix E of the PSD application, the facility uses the emission factors from *EPD Recommended Emission Factors for Lumber Kiln Permitting in Georgia* for direct fired lumber drying kilns. The Division agrees with the facility's use of the methanol, formaldehyde, acetaldehyde, acrolein, and phenol emission factors. The toxic impact analysis is discussed in Section 8.0 and Appendix E of the PSD application.

According to the Division's Air Toxics Guidelines, any TAP with an emission rate above its Minimum Emission Rate (MER) will be required to demonstrate compliance with the Guidelines with a toxic impact assessment. The facility-wide PTE for the above TAPs were compared to the associated Minimum Emission Rates (MERs). Acetaldehyde, acrolein, and formaldehyde, each has a facility-wide PTE over the associated MER and are therefore subject to a toxic impact assessment.

For each TAP identified for further analysis, both the short-term and long-term AAC were calculated following the procedures given in Georgia EPD's *Guideline*. Figure 8-3 of Georgia EPD's *Guideline* contains a flow chart of the process for determining long-term and short-term ambient thresholds. Varn referenced the resources previously detailed to determine the long-term (i.e., annual average) and short-term AAC (i.e., 24-hour or 15-minute). The AACs were verified by the EPD.

Determination of Toxic Air Pollutant Impact

The Georgia EPD *Guideline* recommends a tiered approach to model TAP impacts, beginning with screening analyses using SCREEN3, followed by refined modeling, if necessary, with ISCST3 or AERMOD. For the refined modeling completed, the infrastructure setup for the SIA analyses was relied upon with appropriate sources added for the TAP modeling. Note that per the Georgia EPD's *Guideline*, building downwash is required in the TAP assessment if the facility uses AERMOD.

The impacts of facility-wide TAP emissions were evaluated to demonstrate compliance according to the Georgia Air Toxics Guideline at <https://epd.georgia.gov/air/documents/toxics-impact-assessment-guideline>. The following three TAPs were included in the analysis: acetaldehyde, acrolein, and formaldehyde. The annual and 15-minute AACs of the three TAPs were reviewed based on U.S. EPA IRIS reference concentration (RfC), OSHA Permissible Exposure (PEL), ACGIH Threshold Limit Values (TLV) including STEL (short term exposure limit) or ceiling limit, and NIOSH Recommended Standards (REL) according to the Georgia Air Toxics Guideline. The modeled MGLCs were calculated using the AERMOD dispersion model (v19191) for 1-hour, 24-hour, and annual averaging periods as applicable.

Table 8-1 summarizes the AAC levels and MGLCs of the three TAPs. The maximum 15-min impact is based on the maximum 1-hour modeled impact multiplied by a factor of 1.32. As shown in Table 8-1, the modeled MGLCs for all three TAPs are below their respective AAC levels.

Table 8-1. Modeled MGLCs and the Respective AACs.

Pollutant	CAS	Averaging period	MGLC (µg/m³)	AAC (µg/m³)	Averaging period	MGLC (µg/m³)	AAC (µg/m³)
Acetaldehyde	75070	Annual	0.74	4.55	15-min	8.99	4,500
Acrolein	107028	Annual	0.10	0.35 ⁽¹⁾	15-min	2.07	23
Formaldehyde	50000	Annual	0.64	1.1	15-min	13.33	245

Note: All concentrations are the highest 1st high modeled impacts for all 5 model years.

Conclusions

The air toxics analysis shows conformance with the Georgia Air Toxics Guideline.

For these reasons, it is recommended that a permit be issued based on the project design and operating hours described in the application.

¹ The annual AAC value for acrolein of 0.35 µg/m³ is based on the EPA PCWP RTR 2019. The use of this AAC value was approved by SSPP.

8.0 EXPLANATION OF DRAFT PERMIT CONDITIONS

The permit requirements for this proposed facility are included in draft Permit Amendment No. 2421-025-0001-V-04-2.

Section 1.0: Facility Description

The facility is proposing to convert the existing batch lumber drying kiln K02 to a continuous lumber drying kiln. The kiln will remain direct-fired, and the dry shavings combustion unit that currently provides heated air to the kiln will not be modified. Lumber throughput will increase from a baseline actual throughput of 39.1 MMbf/yr. to a maximum potential of 85 MMbf/yr. Emission increases for the project exceed the PSD SER threshold for VOCs.

Section 2.0: Requirements Pertaining to the Entire Facility

No conditions in Section 2.0 are being added, deleted, or modified as part of this permit action.

Section 3.0: Requirements for Emission Units

Emission Units		Specific Limitations/Requirements	Air Pollution Control Devices	
ID No.	Description	Applicable Requirements/Standards	ID No.	Description
LUMBER MILL				
K01	Drying Kiln No. 1	40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(i) 391-3-1-.02(2)(g)2.	None	NA
K02	Drying Kiln No. 2	40 CFR 52.21 40 CFR 63 Subpart A 40 CFR 63 Subpart DDDD 391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(i) 391-3-1-.02(2)(g)2.	None	NA
S01	Sawmill	391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(ii)	None	NA
P01	Planer Mill	391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(i)	C02	Cyclone
H01	Hammer Mill	391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(i)	C01 C07	Cyclone Cyclone
H02	Wood Hog	391-3-1-.02(2)(b)1. 391-3-1-.02(2)(e)1.(i)	C03	Cyclone
PELLET MILL				
PH1	Pre-Grind Hammermill	391-3-1-.02(2)(e) 391-3-1-.02(2)(n)	None	NA
WB1	Wood Burner – 40 MMBtu/hr. Suspension Direct-Fired Furnace	391-3-1-.02(2)(b) 391-3-1-.02(2)(e) 391-3-1-.02(2)(g)	C05	High- Efficiency Multicyclone
DD1	Triple-Pass rotary drum dryer with 15 ODT/hr. capacity	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	C05	High- Efficiency Multicyclone
HM2	Hammermill with 15 ODT/hr. capacity	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	BH1	Baghouse
PM1, PM2 and PM3	Pellet Mills rated at 5 ODT/hr. each	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	C06	High -Efficiency Cyclone and Wood Burner (100% recycle)

Emission Units		Specific Limitations/Requirements	Air Pollution Control Devices	
ID No.	Description	Applicable Requirements/Standards	ID No.	Description
PC1	Pellet Cooler with 15 ODT/hr. capacity	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	C06	High -Efficiency Cyclone and Wood Burner (100% recycle)
VS	Vibrating Screen	391-3-1-.02(2)(e) 391-3-1-.02(2)(n)	None	NA
PS	Pellet Silo	391-3-1-.02(2)(b) 391-3-1-.02(2)(e)	None	NA
TLO	Truck Loadout	391-3-1-.02(2)(e) 391-3-1-.02(2)(n)	None	NA

Condition 3.2.1 has been modified to include the requirements of 40 CFR 52.21(r)(1). The facility is required to construct and operate the continuous drying kiln (ID No. K02) in accordance with Application No. TV-509812.

New Condition 3.2.7 includes the requirements of 40 CFR 52.21(r)(2). This condition specifies when the facility must commence construction of the continuous drying kiln (ID No. K02).

New Condition 3.2.8 contains the throughput limit, 85 MMbf/yr., for the continuous drying kiln (ID No. K02), which is the basis for the emissions estimates.

New Condition 3.2.9 requires the facility to develop and implement a Site-Specific Kiln Emissions Management Plan (KEMP) within 180 days of the initial startup of the continuous drying Kiln (ID No. K02).

New Condition 3.2.10 requires that the facility operate the power vents on the continuous drying kiln (ID No. K02) at all times when K02 is in operation. The facility meets the Georgia Toxic Guideline by running the power vents whenever K02 is in operation. Operating the kiln without the power vents is a violation to the GA Toxic Guideline.

New Condition 3.3.1 subjects the Continuous Drying Kilns (ID Nos. K01 and K02) to 40 CFR 63 Subpart A and Subpart DDDD.

The new drying kiln is still subject to the GA Rule (b) standard specified in existing Condition 3.4.1 and GA Rule (e) PM emission limit specified in existing Condition 3.4.2.

Section 4.0: Requirements for Testing

No conditions in Section 4.0 are being added, deleted, or modified as part of this permit action.

Section 5.0: Requirements for Monitoring

No conditions in Section 5.0 are being added, deleted, or modified as part of this permit action.

Section 6.0: Other Recordkeeping and Reporting Requirements

Existing Condition 6.1.7 has been modified to include the following new exceedances and excursion:

- Subparagraph b.iii. has been modified to define an exceedance as any twelve consecutive month period for which the total amount of lumber dried in the continuous drying kiln (ID No. K02), combined, exceeds 85 million board feet. This would be a PSD violation.
- New Subparagraph c.viii. defines an excursion as any incidence that the work practice standards & preventative maintenance plan is not followed. This would be a violation of Condition 3.2.9.
- New Subparagraph c.ix. defines an excursion as any incidence that the power vents of the continuous drying kiln (ID No. K02) are not operated while K02 is in operation. This would be a violation of Condition 3.2.10.

New Condition 6.2.10 requires that the facility notify the Division when the continuous drying kiln (ID No. K02) initially starts up.

New Condition 6.2.11 requires that the facility calculate and record the monthly amount of dried lumber processed through the continuous drying kiln (ID No. K02), for each month in the reporting period. If any monthly record exceeds 7.08 MMbf, the facility must notify the Division in writing within 15 days of the following month and include an explanation of how the Permittee intends to maintain compliance with the production limit in Condition 3.2.8.

New Condition 6.2.12 requires that the facility calculate and record the combined 12-month rolling total of dried lumber processed through the continuous drying kiln (ID No. K02), ending in each month in the reporting period.

Section 7.0: Other Specific Requirements

No conditions in Section 7.0 are being added, deleted, or modified as part of this permit action.